



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/343,093

06/30/1999

SHOSHI KATAYAMA

862.2907

7483

5514

7590

11/17/2005

FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER

STOCK JR, GORDON J

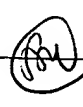
ART UNIT

PAPER NUMBER

2877

DATE MAILED: 11/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/343,093	KATAYAMA, SHOSHI	
	Examiner	Art Unit	
	Gordon J. Stock	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 27-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 27-50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The amendment received September 6, 2005 has been entered into the record.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 27-50** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Nishi (5,243,195)—previously cited** in view of **Matsuura et al. (4,566,795)—previously cited** further in view of **Inoue et al. (6,384,898)**.

As for **claims 27, 29, 30, 35, 47, and 50** Nishi in a projection exposure apparatus discloses the following: two image sensing systems as first measurement systems, an off axis alignment system with two ccd cameras for sensing mark images on the wafer stage and a TTR system to sense images of reticle marks comprising two ccd cameras; measurement systems as second measurement systems comprising a plurality of interferometric systems: one set of interferometric systems to measure the reticle stage at a plurality of points, and another to measure the wafer stage at a plurality of points with an arithmetic system, a calculation section, comprising a main control system; whereas, the measurement system measures while the image sensing system accumulates data at substantially the same time and senses the image while the stage is moving and suggesting that the stage is moved at a constant speed for smooth scanning to guarantee coordination of values (Figs. 2, 7, 10, 24; col. 3, lines 5-65; col. 4, lines 30-50; col.

Art Unit: 2877

11, lines 1-20; col. 15, line 35-55; col. 18, lines 20-35; col. 25, lines 34-50). Specifically, the ccd cameras of the OWA system obtain image data of one accumulated image such as from FM₁ by accumulating image signals formed on said image sensor, ccd camera during an accumulation period (col. 16, lines 8-15). As for the measurement systems measuring a position of the stage a plurality of times during the accumulation period of said image sensors, Nishi does not explicitly state this. Nishi does imply this for the interferometers measure the stage simultaneously with the scanning of the fiducial marks (col. 17, lines 55-67; col. 18, lines 1-30). And Matsuura in an alignment apparatus teaches continuously measuring the stage position with interferometric systems (col. 12, lines 5-20). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the interferometric system measuring the stage position continuously, a plurality of times, in order to precisely know the position of the stage at all times and to have precise a correlation between the position of the stage and the position of the mark image in order to properly calculate the position of the mark. As for the arithmetic section, calculation section, and a calculating step that calculates the position of the mark based on the image data and data of plural positions of the stage measured, Nishi in view of Matsuura do not explicitly state this; however, Inoue in a projection exposure apparatus teaches the determining of mark position data via stage position data and image data (col. 4, lines 60-67; col. 5, lines 1-15). Therefore, it would be obvious to one skilled in the art at the time the invention was made to have the calculation section/arithmetic section calculate mark position based on the image data and the stage position information in order to accurately determine the position of the mark relative to the stage and imaging system.

As for **claim 28**, Nishi in view of Matsuura disclose everything as above (see **claim 27** above). In addition, the off axis system obtains average positions (col. 16, lines 1-20).

As for **claim 31**, Nishi in view of Matsuura disclose everything as above (see **claim 27** above). In addition, the image sensing system is an off axis alignment system (Fig. 10).

As for **claim 32**, Nishi in view of Matsuura disclose everything as above (see **claim 27** above). In addition, the measurement system is an interferometer system (Fig. 2: IRX, IRY, IFX, IFY2, IFY1).

As for **claim 33**, Nishi in view of Matsuura disclose everything as above (see **claim 27** above). In addition, Nishi discloses the object has a plurality of areas, fiducial plate and the wafer; whereas, the positions of the plurality of areas are found such as per shot region (Figs. 9 and 18; col. 29, lines 35-50).

As for **claim 34**, see **claim 33** above. Nishi in view of Matsuura disclose everything as above (see **claim 27** above). In addition, Nishi discloses calculating positional deviations are calculated for the marks in relation to multiple areas such as subsets comprising shot areas (Figs. 17-19; 25-26; col. 29, lines 35-60).

As for **claims 36, 38, 39, 44, and 48** Nishi discloses the following: an exposure apparatus having a wafer stage (Fig. 2: WST); a lens section (PL); a positioning system and calculation section, a stage driver with main control system for calculating positions (Fig. 24); a first measurement system which has an image sensor, an off axis alignment system (Fig. 10) and measures a position of a mark formed on the substrate, fiducial mark on fiducial plate, or a mark on the wafer (Fig. 9; Fig. 10: IMP); a second measurement system, an interferometric system for measuring the stage a plurality of times; whereas, the stage position measurement system

Art Unit: 2877

measures while the image sensing system, the first measurement system, accumulates data at substantially the same time and senses the image while the stage is moving, and suggests that the stage is moved at a constant speed for smooth scanning to guarantee coordination of values (Figs. 2, 10, 24; col. 3, lines 5-65; col. 4, lines 30-50; col. 11, col. 15, line 35-55; col. 18, lines 20-35; col. 25, lines 34-50). Specifically, the ccd cameras of the OWA system obtain image data of one accumulated image such as from FM_1 by accumulating image signals formed on said image sensor, ccd camera during an accumulation period (col. 16, lines 8-15) wherein, the marks may be formed on the wafer too (col. 29, lines 35-60). As for the measurement systems measuring a position of the stage a plurality of times during the accumulation period of said image sensors, Nishi does not explicitly state this. Nishi does imply this for the interferometers measure the stage simultaneously with the scanning of the fiducial marks (col. 17, lines 55-67; col. 18, lines 1-30). And Matsuura in an alignment apparatus teaches continuously measuring the stage position with interferometric systems (col. 12, lines 5-20). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the interferometric system measuring the stage position continuously, a plurality of times, in order to precisely know the position of the stage at all times and to have precise a correlation between the position of the stage and the position of the mark image in order to properly calculate the position of the mark. As for the calculation section and a calculating step that calculates the position of the mark based on the image data and data of plural positions of the stage measured, Nishi in view of Matsuura do not explicitly state this; however, Inoue in a projection exposure apparatus teaches the determining of mark position data via stage position data and image data (col. 4, lines 60-67; col. 5, lines 1-15). Therefore, it would be obvious to one skilled in the art at

Art Unit: 2877

the time the invention was made to have the calculation section/arithmetic section calculate mark position based on the image data and the stage position information in order to accurately determine the position of the mark relative to the stage and imaging system.

As for **claim 37**, Nishi in view of Matsuura disclose everything as above (see **claim 36** above). In addition, Nishi discloses storing image signals and obtaining an average position with the off axis system (col. 16, lines 1-20).

As for **claim 40**, Nishi in view of Matsuura disclose everything as above (see **claim 36** above). In addition, the image sensing system is an off axis alignment system (Fig. 10).

As for **claim 41**, Nishi in view of Matsuura disclose everything as above (see **claim 36** above). In addition, the measurement system is an interferometer system (Fig. 2: IFX, IFY2, IFY1).

As for **claims 42 and 43**, Nishi in view of Matsuura disclose everything as above (see **claim 36** above). In addition, Nishi discloses the object has a plurality of areas, fiducial plate and the wafer; whereas, the positions of the plurality of areas are found such as per shot region (Figs. 9 and 18; col. 29, lines 35-50). In addition, Nishi discloses calculating positional deviations are calculated for the marks in relation to multiple areas such as subsets comprising shot areas (Figs. 17-19; 25-26; col. 29, lines 35-60).

As for **claims 45 and 46**, Nishi in view of Matsuura disclose everything as above (see **claim 36** above). In addition, Nishi discloses: as for a determination system: the main control system suggests a determining system for controlling everything and providing such modes as checking rotational error, Abbe error determination, rough and fine alignment modes (cols. 18-

20); whereas, the system exposes a pattern on the wafer from the reticle after alignment and positioning is done (col. 2, lines 60-67; col. 6, lines 60-67; col. 7, lines 1-15).

As for **claim 49**, Nishi discloses the following: placing a substrate applied with a resist, a wafer on the stage (Fig. 2: W; col. 12, lines 10-15); first measuring a position of a mark formed on the substrate (Fig. 10: IMP) based on image data that is obtained during a period of time and second measuring a position of the stage during accumulation period. Specifically, the ccd cameras of the OWA system obtain image data of one accumulated image such as from FM₁ by accumulating image signals formed on said image sensor, ccd camera during an accumulation period (col. 16, lines 8-15); wherein, the marks may be formed on the wafer too (col. 29, lines 35-60); calculating the position of the mark based on the measurements; aligning the substrate using the stage of the exposure apparatus (Figs. 2, 10, 24; col. 3, lines 5-65; col. 4, lines 30-50; col. 11, col. 15, line 35-55; col. 18, lines 20-35; col. 25, lines 34-50); and transferring a pattern to the substrate using a projection lens (col. 2, lines 60-67; col. 6, lines 60-67; col. 7, lines 1-15). As for the second measuring a position of the stage a plurality of times during the accumulation period of said image sensors, Nishi does not explicitly state this. Nishi does imply this for the interferometers measure the stage simultaneously with the scanning of the fiducial marks (col. 17, lines 55-67; col. 18, lines 1-30). And Matsuura in an alignment apparatus teaches continuously measuring the stage position with interferometric systems (col. 12, lines 5-20). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the stage position measured continuously, a plurality of times, in order to precisely know the position of the stage at all times and to have precise a correlation between the position of the stage and the position of the mark image in order to properly calculate the position of the

Art Unit: 2877

mark. As for a calculating step that calculates the position of the mark based on the image data and data of plural positions of the stage measured, Nishi in view of Matsuura do not explicitly state this; however, Inoue in a projection exposure apparatus teaches the determining of mark position data via stage position data and image data (col. 4, lines 60-67; col. 5, lines 1-15).

Therefore, it would be obvious to one skilled in the art at the time the invention was made to have the calculation step calculate mark position based on the image data and the stage position information in order to accurately determine the position of the mark relative to the stage and imaging system.

Response to Arguments

4. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (571) 273-8300

Art Unit: 2877

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

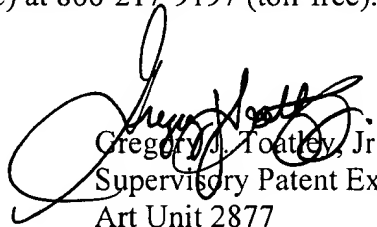
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



gs

November 10, 2005



Gregory J. Toatley, Jr.
Supervisory Patent Examiner
Art Unit 2877
14 Nov 05